IS 12488 (1988): Haulage Rope Cappels [MED 8: Mining Techniques and Equipment]

BLANK PAGE

UDC 622·673·6 : 677·721

IS : 12488 - 1988

(Reaffirmed 1999)

Indian Standard

SPECIFICATION FOR HAULAGE ROPE CAPPELS

Mine Transportation Sectional Committee, EDC 91; Mine Haulage Subcommittee, EDC 91 : 4 (EDC 50 : 10) [Ref : Doc : EDC 91/50 (4061)]

1. Scope — Lays down the requirements for rope cappels for use with haulage ropes to attach the haulage rope with tub/mine car or a set of mine tubs or mine cars or any other means of conveyance.

2. Terminology — For the purpose of this standard, following definitions shall apply.

2.1 *Basket* — The tapered portion of the socket.

2.2 *Cappel* — *See* **2.23** of IS : 7580-1975 'Glossary of mining terms (transport)'.

2.3 *Capping* — *See* **2.24** of IS : 7580-1975.

2.4 *Seizing* — The wire wrapped around a rope to hold its wires in position when cutting and/or capping.

2.5 *Soeket* — The metallic body of the capping.

3. Types

a) *Type A* — White metal conical cappel with open type or closed type socket, and

b) *Type B* — Conical cappel with zinc cone and tail strand.

4. Dimensions

4.1 *Type A Cappels*

4.1.1 *Open type socket* — As specified in Table 1.

4.1.2 *Closed type socket* — As specified in Table 2.

4.1.3 *Pins for open type socket* — As specified in Table 3.

4.2 *Type B Cappels*

4.2.1 *Sockets* — As specified in Table 4.

4.2.2 *Pins and nuts for sockets* — As specified in Table 5.

4.2.3 *Zinc cone and tail strand* — As specified in Table 6.

4.3 *Links and Closed Shackel* — As specified in Table 7.

4.4 *Tolerances*

4.4.1 The diameter of the bore *D* and *E* in Table 4 shall be checked by a taper plug gauge of suitable size. When the gauge is in position, it shall not be possible to insert a 0·25 mm diameter wire feeler gauge between the taper plug gauge and the bore. This shall apply to either end of the bore.

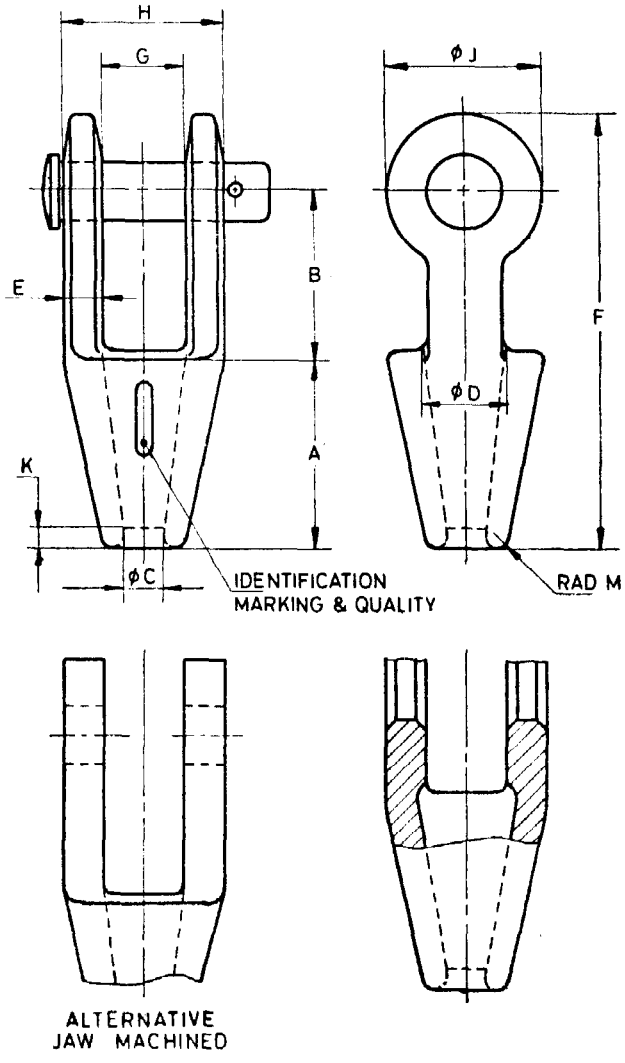
Adopted 1 November 1988 | | Gr 6

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

TABLE 1 DIMENSIONS FOR OPEN SOCKET FOR TYPE A CAPPEL

(*Clause* 4.1.1)

All dimensions in millimetres.

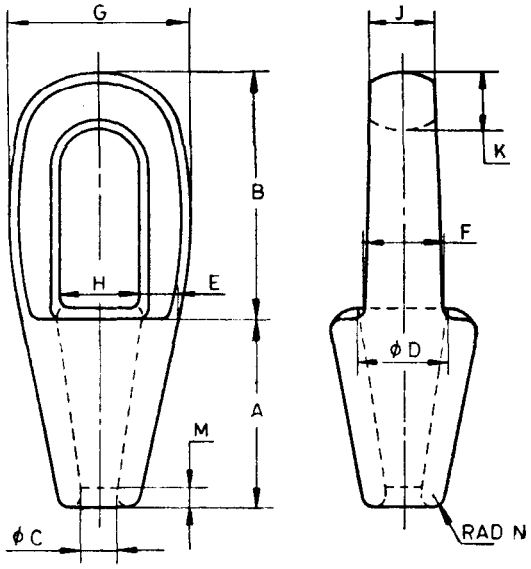


Diameter of Rope	A	B	C	D	E	F	G	H	J	K	M
16	69·8	63·5	18·3	31·8	11·1	158·8	31·8	58·7	50·8	7·9	1·6
19	76·2	66·7	21·4	38·1	12·7	174·6	38·1	69·9	63·3	9·5	2·0
22	85·7	76·2	25·4	44·5	14·3	196·9	42·9	77·8	69·9	11·1	2·4
25·4	104·8	88·9	28·6	50·8	17·5	236·5	47·6	88·9	85·7	12·7	2·4
29	114·3	101·6	31·8	57·2	19·0	261·9	50·8	93·7	92·0	13·2	2·8
32	133·4	111·1	34·9	63·5	23·8	296·9	54·0	111·1	104·8	15·9	3·2

TABLE 2 DIMENSIONS FOR CLOSED TYPE SOCKETS OF TYPE A CAPPELS

(*Clause* 4.1.2)

All dimensions in millimetres.

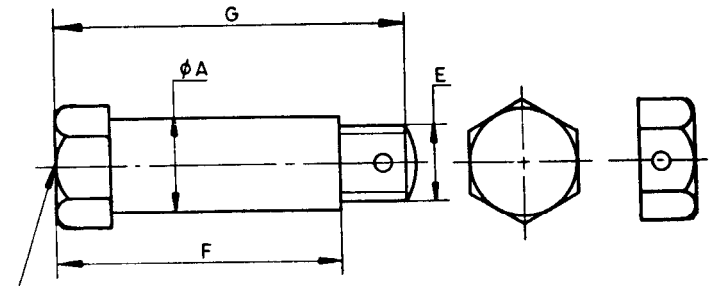


Diameter of Rope	A	B	C	D	E	F	G	H	J	K	M	N
16	69·9	88·9	18·3	31·8	11·1	27·0	63·5	31·8	20·6	19·0	7·9	1·6
19	76·2	101·6	21·4	38·1	12·7	33·3	74·7	38·1	25·4	23·8	9·5	2·0
22	85·7	114·3	25·4	44·5	14·3	39·7	84·1	44·5	28·6	25·4	11·1	2·4
25·4	104·8	130·2	28·6	50·8	17·5	46·0	100·0	50·4	35·0	28·6	12·7	2·4
29	114·3	142·9	31·8	57·0	19·0	50·8	114·3	57·0	38·1	31·8	14·3	2·8
32	133·0	152·4	35·0	63·5	23·9	60·3	123·9	63·5	41·3	38·1	15·9	3·2

TABLE 3 DIMENSIONS FOR PINS FOR OPEN TYPE SOCKETS OF TYPE A CAPPELS

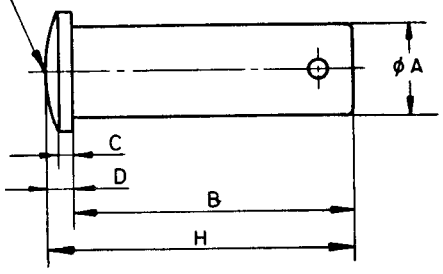
(*Clause* 4.1.3)

All dimensions in millimetres.



IDENTIFICATION AND QUALITY MARKING

BOLT TYPE PIN



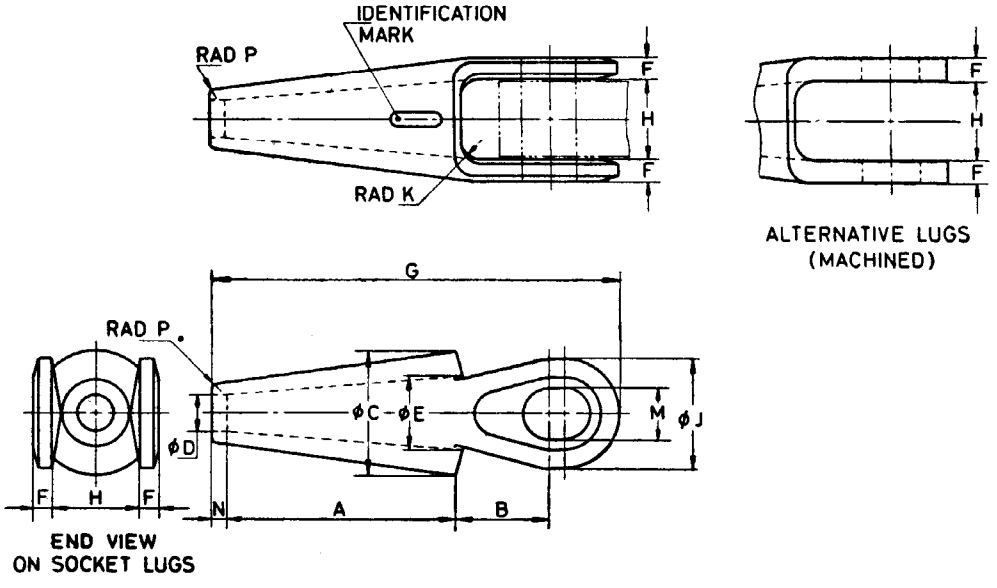
PLAIN PIN

Diameter of Rope	A	B	C	D	E	F	G	H
16	23·8	74·6	4·0	6·3	15·9	60·3	81·0	81·0
19	28·6	85·8	4·8	7·1	18·0	71·4	92·9	92·9
22	31·8	95·3	4·8	8·0	22·2	81·0	109·5	103·2
25·4	38·1	109·5	5·6	9·5	28·6	90·5	127·8	118·1
29	41·3	114·3	6·4	11·1	31·8	95·3	136·5	125·4
32	47·6	136·5	8·0	12·7	38·1	112·7	162·0	149·2

TABLE 4 DIMENSIONS FOR SOCKETS OF TYPE B CAPPELS

(*Clauses* 4.2.1 *and* 4.4.2)

All dimensions in millimetres.

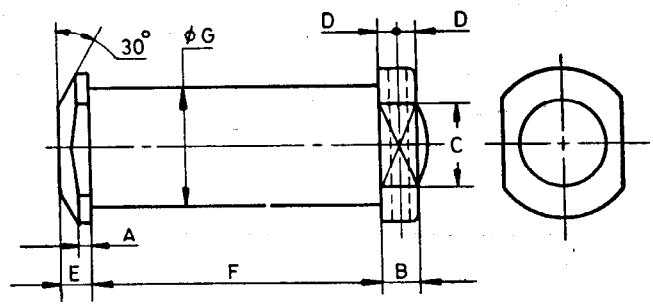


Diameter of Rope	A	B	C	D	E	F	G	H	J	K	M	N	
16	133·4	63·6	69·9	20·6	44·5	12·7	239·7	49·2	63·5	19·0	31·8	9·5	3·2
19	155·6	69·9	82·6	23·8	50·8	15·9	274·6	55·6	69·9	19·0	34·9	11·1	3·2
22	177·8	79·4	92·0	27·2	57·2	17·5	312·7	61·9	79·4	22·2	41·3	12·7	3·2
25·4	196·9	88·9	101·6	30·2	63·5	19·0	346·0	68·3	88·9	25·4	44·5	12·7	3·2
29	215·9	101·6	114·3	33·3	69·9	22·2	387·4	76·0	101·6	25·4	50·8	15·9	4·8
32	238·1	108·0	123·8	36·5	76·2	23·8	409·1	82·6	108·0	31·8	54·0	15·9	4·8

TABLE 5 DIMENSIONS FOR PINS AND NUTS FOR TYPE B CAPPELS

(*Clauses* 4.2.2 *and* 4.4.2)

All dimensions in millimetres.

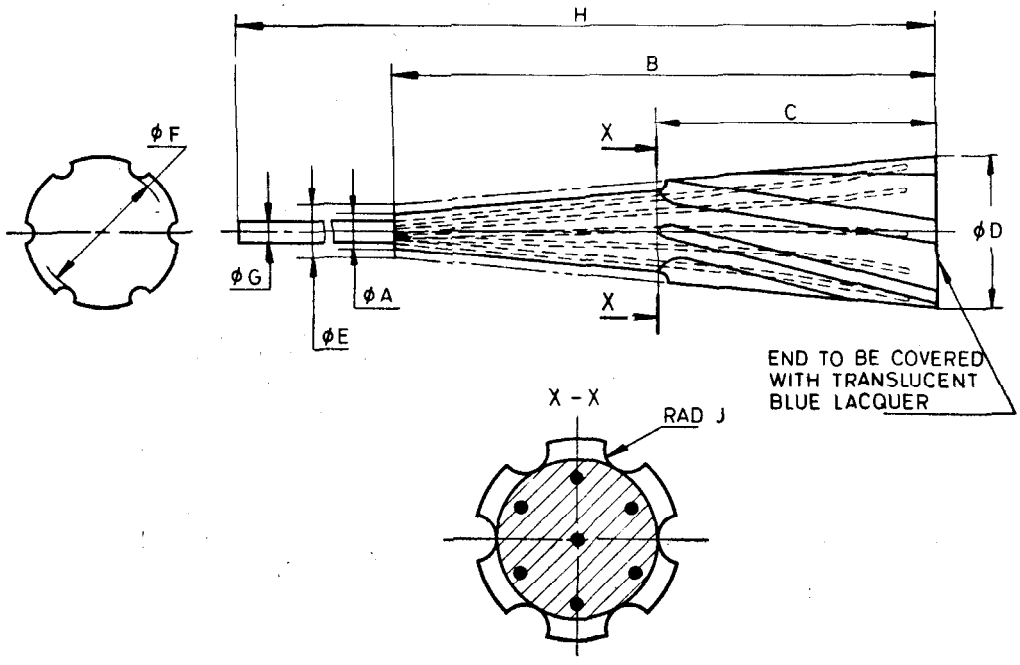


Diameter of Rope	A	B	C	D	E	F	G
16	3·2	9·5	22·2	4·8	7·9	77·0	31·8
19	4·8	9·5	28·6	4·8	7·9	89·7	34·9
22	4·8	12·7	34·9	6·4	9·5	100·0	38·1
25·4	4·8	12·7	34·9	6·4	9·5	109·5	44·5
29	4·8	15·9	38·1	7·9	11·1	125·4	50·8
32	4·8	15·9	41·2	7·9	12·7	134·1	54·0

TABLE 6 DIMENSIONS FOR ZINC CONE AND TAIL STRAND UNITS OF TYPE B CAPPELS

(*Clause* 4.2.3)

All dimensions in millimetres.

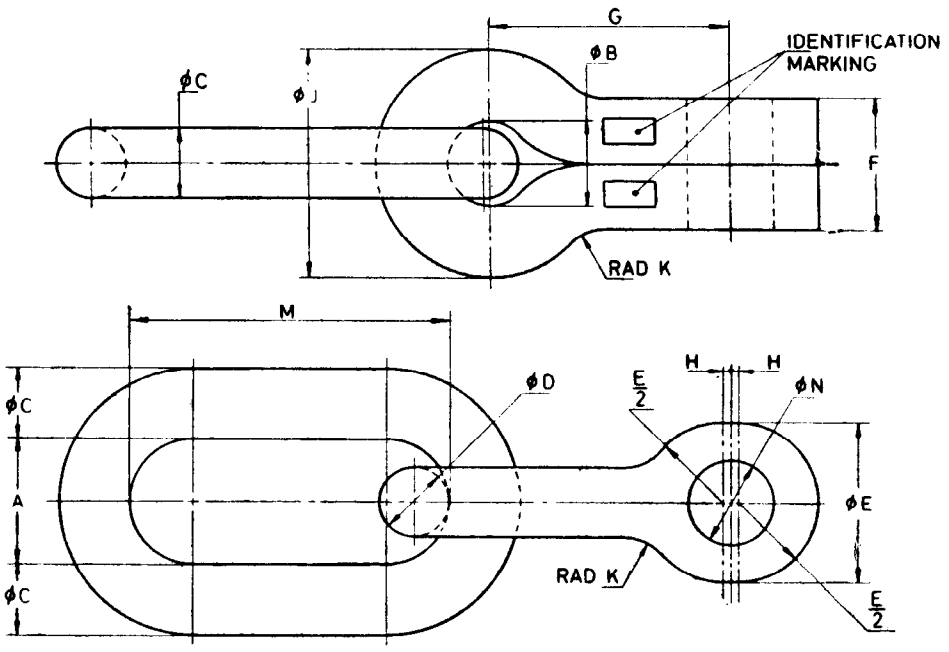


Diameter of Rope	A		C	D	E	F	G	H	J
16	9·5	142·9	73·0	40·5	14·7	35·3	6·4	685·8	3·2
19	9·5	168·3	85·7	45·2	15·9	38·9	7·1	685·8	3·6
22	11·1	190·5	98·4	50·8	18·7	43·2	8·3	711·2	4·4
25·4	12·7	209·6	104·8	56·2	21·0	48·8	9·5	812·8	4·8
29	12·7	228·6	117·5	61·1	22·2	51·6	10·3	914·4	5·6
32	14·3	254·0	130·2	67·5	24·6	57·2	11·5	1 016·6	6·0

TABLE 7 DIMENSIONS FOR LINK AND CLOSED SHACKLE

(*Clause* 4.3)

All dimensions in millimetres.



Diameter of Rope	A	B	C	D	E	F	G	H	J	K	M	N	Working Load kN
16	44·5	27·0	22·2	22·2	63·5	46·0	88·9	1·6	71·5	15·9	120·7	31·8	25
19	50·8	33·3	28·6	28·5	69·9	52·4	95·2	3·2	90·5	19·1	127·0	34·9	36
22	50·8	36·5	31·8	31·8	79·4	58·7	101·6	3·2	100·0	22·2	133·4	41·3	49
25·4	50·8	36·5	31·8	34·9	88·9	63·5	108·0	3·2	100·0	22·2	136·5	44·5	64
29	57·2	42·9	38·1	38·1	101·6	71·4	127·0	3·2	119·1	25·4	152·4	50·8	80
32	57·2	46·0	41·3	41·3	108·0	77·8	127·0	3·2	119·1	25·4	161·9	54·0	100

4.4.2 Following tolerances shall apply to the pins, pin holes and lug dimensions:

Socket Size Range	Dimension	Tolerance (mm)
Full range	Width over lugs	+ 1·00 − 0·25
Full range	Thickness of lugs, *F* (*see* Table 4)	+ 0·50 − 0·25
25 mm and below	Diameter of pin hole, *M* (*see* Table 4)	+ 1·2 − 0
Above 25 mm		+ 1·5 − 0
Full range	Length over pin shoulders, *F* (*see* Table 5)	+ 0·25 − 0·25
32 mm and below	Diameter of pin, *G* (*see* Table 5)	+ 0·08 − 0·25

5. Materials

5.1 Sockets, pins, link and shackle units shall be manufactured from steel conforming to 11Mn2 or 20Ni55Cr50Mo20 of IS : 4432-1967 'Specification for case hardening steels' or 20Mn2 of IS : 1570-1961 'Schedules for wrought steels for general engineering purposes'.

5.2 White metal used for capping shall conform to Grade 5 of IS : 25-1979 'Specification for antifriction bearing alloys (*third revision*)'.

5.3 Zinc used in case of Type B cappel shall conform to Grade Zn 98 of IS : 209-1979 'Specification for zinc (*third revision*)'.

5.4 Tail strand of Type B cappel shall be made from galvanized steel wire strand of 6/1 construction. The wires used in the construction of strand shall be of 1 230 or 1 420 tensile designation (the wire shall have the tensile strength between 1 428 MPa and 1 530 MPa having Type B galvanizing according to IS : 1835-1976 'Specification for round steel wire for ropes (*third revision*)'.

5.5 Nuts and washers shall be manufactured from steel conforming to IS 1570-1961.

6. Designation — A haulage rope cappel of Type A with open type socket suitable for wire rope of 16 mm size and conforming to this standard shall be designated as:

Haulage Rope Cappel AO 16 IS : 12488

Note — Letters 'O' and 'C' shall be used to designate open type and closed type socket respectively in case of Type A rope cappel only.

7. General Requirements

7.1 *Factor of Safety* — The rope cappels shall have a factor of safety of not less than 8 with respect to safe working load for which the cappel is designed.

7.2 Capping of sockets shall be done in accordance with IS : 3937 (Part 2)-1974 'Recommendations for socketing of wire ropes: Part 2 Socketing with white metal (*first revision*) ' in case of Type A cappels and in accordance with IS : 3937 (Part 1)-1974 ' Recommendations for socketing of wire ropes: Part 1 Socketing with zinc (*first revision*) ' in case of cappels of Type B. The fitting of terminal wire rope sockets by the cone and tail method shall be done in accordance with IS : 12489-1988 ' Recommendations for fitting terminal wire rope sockets by the cone and tail method '.

8. Manufacturing Requirements

8.1 Sockets and pins shall be manufactured by hot forging and shall be machined subsequently.

8.2 Sockets shall show good workmanship and shall be free from any defects. Flashes and fins shall be dressed to level surfaces.

8.3 Taper in the socket shall be machined uniformly and smoothly. The small end of the basket shall terminate in a short parallel length with radius machined at the orifice.

8.4 Outside and inside faces of the lugs shall be machined.

8.5 Pin holes shall be drilled or otherwise machined from solid in one operation and at one setting. The axis of pin when fitted shall be at right angles to the axis of the socket basket. The surface of the hole and the pin shall be smooth and well finished.

8.6 For sockets where gas cutting is used to assist in rough shaping, adequate excess material shall be left after gas cutting for removal, by machining or grinding, of surface defects, effects of gas cutting, etc.

8.7 The links shall be drop forged. Alternatively, the links may be welded by the electric pressure-butt, electric flash-butt or atomic hydrogen welding.

8.7.1 The weld shall be smoothly finished all round, care being taken to avoid unsoundness and to ensure adequate penetration and fusion throughout the section.

9. Heat Treatment — After the forgings and gas cuttings, all the components of the haulage rope cappel except zinc cone and split pin, shall be suitably hardened and tempered.

9.1 The hardness of the components after heat treatment shall be as follows:

Material of Component	*Hardness Value HV*
11 Mn2	190 to 220
20 Mn2	200 to 250
20 Ni55Cr50Mo20	250 to 280

9.1.1 The recommended hardening and tempering temperatures and quenching media are given below:

Steel Designation	*Hardening Temperature* °C	*Tempering Temperature* °C	*Quenching Media*
11 Mn2	870 – 910	550 – 660	Water or oil
20 Mn2	860 – 900	550 – 660	Water or oil
20 Ni55Cr50Mo20	820 – 850	—	Water

10. Testing

10.1 Each finished unit shall be proof loaded to a load of not less than three times the safe working load for which the unit is designed. The unit shall satisfactorily withstand such proof load without any deformation.

10.2 After conducting the proof load test, the sockets, pins and connecting links shall be magnetically or ultrasonically or by both the methods where the purchaser so desires, tested for cracks and flaws, etc.

10.3 Any component which does not conform to **10.1** and **10.2** shall not be used and shall be destroyed effectively.

11. Marking — Each component shall be legibly and permanently stamped on unwearable portion with the following:

a) Manufacturer's name or his recognized identification mark,

b) Safe working load,

c) Nominal size of rope with which the cappel is to be used, and

d) Abbreviation of the material 'M' for 11Mn2 and 20Mn2 and 'N' for 20Ni55Cr50Mo20.

EXPLANATORY NOTE

In the preparation of this standard, assistance has been derived from the Circular No. DGMS (Tech)/Cir No. 12 of 1976 and DGMS (Tech)/Cir No. 7 of 1978 issued by the Directorate General of Mines Safety.

Printed at New India Printing Press, Khurja, India